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COST-EFFECTIVENESS ANALYSIS AND U.S. DEPARTMENT OF AGRICULTURE NUTRITION EDUCATION PROGRAMS

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ABSTRACT

Of the three USDA programs reviewed that have a nutrition education component, only one appears to lend itself immediately to cost-effective analysis--the Expanded Food and Nutrition Education Program. The other two programs (Nutrition Education and Training, and the Special Supplemental Food Programs for Women, Infants, and Children) are each characterized by a myriad of local education efforts which, individually, do not seem to subscribe to cost-effectiveness analyses but, collectively, may permit comparing alternative nutrition education strategies if result indicators and cost data can be assembled from selected sites.

Keywords: Nutrition, education, cost-effectiveness analyses, evaluation

COST-EFFECTIVENESS ANALYSIS AND U.S. DEPARTMENT OF AGRICULTURE NUTRITION EDUCATION PROGRAMS

By Jon Weimer*

INTRODUCTION

Much evidence exists to support the contention that inappropriate food habits are related to a number of health problems and to incidences of certain types of mortality (4, 9, 11). 1/ Assuming that knowledge about nutrition, effectively communicated, could favorably influence human development and health, labor productivity, and the quality of life, the findings of a study conducted by the Congressional Research Service (CRS), Library of Congress, seem ironic. According to the CRS, of the $7.8 billion spent on domestic nutrition programs by the Federal Government in 1976, only $68.2 million was spent on nutrition education. So little importance was apparently attached to nutrition education that the CRS study team found it difficult to document Federal expenditures for nutrition education. Of the 30 Federal programs claiming "nutrition education" as a component of their activities in 1976, only 14 could identify the portion of their budget actually spent on nutrition education. Furthermore, only one of these programs allocated funds to assess the impact of nutrition education on food consumption and habits (1).

The CRS findings indicated an almost complete lack of political support for programs which guide consumers in purchasing and preparing nutritious foods. The Food and Agriculture Act of 1977 represents a major turning point in the attitude of the Congress toward the importance

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1/ Numbers in parentheses refer to items in the references at the end of the report.

of nutrition. In the act, the Congress recognizes the relationship between diet and health and the need to conduct and assess nutrition education activities. The U.S. Department of Agriculture (USDA) was specifically designated as one of the lead agencies in implementing nutrition education programs. As the money spent on nutrition education increases and as nutrition education programs receive more attention, it becomes increasingly important for USDA to assess program effectiveness objectively. Cost-effectiveness (C-E) analysis may provide a means for making this kind of assessment. In this article, several large-scale USDA programs are described which have a nutrition education component, and the potential use of C-E analysis in evaluating these programs is examined.

COST-EFFECTIVENESS ANALYSIS

It is easy to espouse adequate nutrition as a basic human right, but policies and programs that guarantee that right require funding and must compete with other important social and political programs. Also, given a firm budgetary commitment to adequate nutrition, we must be able to compare nutrition education programs with the same goals. C-E analysis has been praised as an objective procedure that can be used in assessing nutrition education programs. An underlying premise of C-E analysis is that quantifying the effects of programs and evaluating them relative to costs will make possible more efficient use of resources. C-E requires that the effects be quantified in comparable terms across project or policy alternatives; it also requires, obviously, that cost information relating to the implementation of specific programs be assembled. Without accurate information on the costs and impacts of nutrition efforts, it is argued, planners cannot allocate resources to the best programs (5, 6).

Effectiveness Measures

The effectiveness of a nutrition education program should be measured in tangible terms (5). Indicators of effectiveness used in selecting and evaluating alternative nutrition education programs generally fall into four categories:

1. Cognitive changes. These effects would include such indicators as increased knowledge about food and nutrition; greater understanding of the relationship between nutrition and health; and positive changes in attitude and opinion about food, nutrition, and health.
2. Behavioral changes. Desired behavioral effects might include the intake of "adequate" amounts and types of foods, and the storage, handling, and preparation of foods in ways which protect their nutritive value.
3. Anthropometric changes. These changes relate to comparative body growth measurements, such as height or weight.
4. Changes in morbidity and mortality. As the ultimate goal of nutrition programs is to reduce morbidity and mortality associated with malnutrition, the amount by which a program reduces these problems clearly indicates effectiveness.

Validity of Measurements

A problem inherent in evaluating any program is the validity of the measures of effectiveness used. Two types of measures will be discussed to illustrate the problem.

The 24-hour food recall is one of the traditional methods used in dietary assessment studies to measure effectiveness. Subjects are asked to recall what they and/or other family members ate during the previous 24 hours.

There are at least four sources of potential invalidity with this type of measurement tool:

1. Instability of diet patterns. Most Americans probably do not eat a completely balanced diet each day. On any given day, diet may be influenced by factors such as illness, available food, and plans of family members. Interviewers can avoid collecting data they know to be invalid for any of the above reasons, but they cannot hope to eliminate all such sources of invalidity.
2. Memory imperfection. Some subjects may, simply, be unable to remember exactly what was eaten on the previous day.
3. "Halo" effect. Some respondents may say what they think they are expected to say rather than report what they actually consumed.
4. Interviewer intervention. If interviewers have a vested interest in the success of a particular project, they may modify or enhance reported responses.

Plate waste measurements have also been used to compare the acceptability of different categories of foods or specific foods prior to and following an intervening program such as nutrition education. Problems associated with this type of measurement relate to all the possible sources of variability that may be difficult to control, for example, variability of portioned items, methods of preparation, methods of serving, food service-student relationship, time meals are served, and disposition of waste outside the cafeteria.

These examples of measures of effectiveness illustrate that such tools have limitations which planners conducting the assessment face and should, therefore, recognize.

USDA NUTRITION EDUCATION PROGRAMS

Two of the three USDA programs discussed here originated with the Child Nutrition Act of 1966. Its intent was to safeguard the health and well-being of the Nation's children. Originally, it expanded the various food service programs for children. Specific amendments have increased emphasis on nutrition education.

Nutrition Education and Training Program

Background

In November 1977, the Child Nutrition Act was amended by Public Law 95-166, which authorized USDA to operate a grant program for nutrition education and training. This program, referred to as the Nutrition Education and Training Program (NET), is administered by the Food and Nutrition Service (FNS) of USDA. States use Federal funds to disseminate nutrition information to children, to provide inservice training to food service and teaching personnel, and to develop curricula and materials; thus, the NET Program was envisioned as an "integrated" approach to nutrition education. State funds are used for contracts and grants to develop and/or disseminate materials and/or services. To be eligible for this program, a State must appoint a "State Coordinator" who is responsible for assessing nutrition education and training needs, developing a State plan to meet identified needs, and implementing the program described in that plan.

During the State agency's first year of participation, the grant it receives includes money for initiating a "needs assessment." The agency collects data to formulate the State plan for each fiscal year. According to program regulations, the needs assessment identifies discrepancies between "what should be" and "what is" to determine the State's nutrition education and training needs, that is, to identify priorities. The State plan describes the results of the needs assessment and indicates the specific objectives of

the State's NET program. The State plan includes procedures for evaluating program activities according to their success in achieving each objective.

States received funds in fiscal years 1978 and 1979 based on a formula of 50 cents per child enrolled in schools and institutions, with no State receiving less than $75,000 annually. Twenty-six million dollars was appropriated for each of fiscal years 1978 and 1979. For fiscal year 1980, $20 million was appropriated (again, with no State receiving less than $75,000) which approximates 30 cents per enrolled child. As of this writing, the NET program had been extended through fiscal year 1984, with $15 million being authorized for the remaining years. The distorted time frame between the publication of final regulations governing the implementation and operation of the program (May 15, 1979) and the end of fiscal year 1978 (September 30, 1978) initially created a lag effect in funding to and expenditures by States. For example, as of March 1979, only about $11 million had actually been spent on nutrition education, and fiscal year 1979 funds were not released until April 1979; States were informed that fiscal year 1978 and 1979 funds had to be at least obligated by September 30, 1979.

Nutrition Education: Implementation and Evaluation

As might be expected, much diversity exists among the States regarding the types of projects being conducted which, in turn, probably reflects the variability in preparedness and the different kinds of education organization structures within States to implement the program. In some States, nutrition education may already have been a component of children's school curriculum, and/or nutrition education and training to food service and academic personnel may already exist; in other States, the NET concept and funding for nutrition education and training were imposed where nothing had existed before. In one State, local school districts may be free to develop projects they feel are suitable for their own needs, whereas in another State, the NET coordinator,

in conjunction with the State Department of Education, may oversee a more coordinated effort among local school districts and scrutinize individual projects very closely. Therefore, although FNS must approve each State's nutrition education plan, the States, in general, and the local school jurisdictions, in particular, may have considerable autonomy in terms of the specific types of delivery techniques used, the content of materials disseminated, and the evaluation methodology employed. For the sake of expediency, some projects may not have developed their own curriculums but have selected "packaged" nutrition education programs. Projects may also have differed as to where their initial efforts were directed, for example, toward instructing teachers and food service personnel in the principles of nutrition rather than classroom teaching.

USDA guidelines regarding the evaluation component, for example, are quite broad. A State Agency Plan Guideline booklet, written by FNS, states "...evaluation is a key part of any nutrition education and training program... various evaluative techniques may be used.... Examples include pre- and post-tests, informal question and answer sessions, feedback from food service personnel, teachers, and children" (7).

No specific regulation requires State agencies to develop the most cost-effective strategies. It is understandable that the States, in the early stages of the NET Program and under pressure to meet initial funding deadlines, would not be disposed to engage in research design methodology. A cynic might argue that, with States being guaranteed funds based on enrollment, there is no incentive to develop the most cost-effective approaches.

Although it would appear that States do not currently undertake C-E analyses of nutrition education alternatives, the NET Program may serve as a valuable empirical data base from which cost-effectiveness analyses could be applied, providing valuable information about the effectiveness of various

nutrition education delivery strategies. The diversity of activities undertaken by different States (and the accompanying problems of differentiating effect of and expenditures for nutrition education to children versus providing training to food service and teaching personnel) makes any assessment difficult. However, it may be possible to identify clusters of program operations, each cluster consisting of local projects that are alike regarding measures of effectiveness applied, even though projects within that cluster may differ with respect to other attributes. Obviously, it is important to identify costs and other factors by which projects within each cluster would vary. At this writing, FNS had just completed a study which will provide a descriptive profile of NET Program activities and which may permit such projects to be identified.

A common cry in the field of nutrition education is that no one technique yet developed or tested has been certified as the most effective in meeting the diverse nutrition education needs of U.S. citizens. However, without evaluating different delivery strategies using comparable measurements, nutrition educators and planners can be expected to carry on an endless debate about the relative merits of alternative program delivery strategies (5).

Special Supplemental Food Program for Women, Infants and Children

Background

The 1969 White House Conference on Food, Nutrition, and Health recommended that special attention be given to the nutritional needs of pregnant women and preschool children. The Special Supplemental Food Program for Women, Infants, and Children (WIC) was authorized (under an amendment to the Child Nutrition Act) in 1972 as a 2-year pilot project to provide food supplements to pregnant, postpartum, and breast-feeding women; infants; and children up to 4 years old. FNS also administers the WIC program; it has been extended three times since its creation, with authorized funds being

increased from $20 million in fiscal year 1972 to $750 million in fiscal year 1980. Participation increased from approximately 200,000 people in fiscal year 1974 to about 1.9 million people in fiscal year 1980.

The current target population is limited to pregnant women, postpartum women (up to 6 months after delivery), infants (up to 1 year old), and children (up to 5 years old) from low-income families. All participating mothers and children are individually certified by a competent professional as "nutritional risks" because of nutritional need and inadequate family income. The overall goal of the WIC Program is to improve the health of participants by providing nutritious foods and nutrition education as an adjunct to good health care.

Each State agency submits an annual plan of operation and administration as a prerequisite to receiving Federal funds. Funds are made available to participating State health departments or comparable State agencies. The State agencies, in turn, distribute funds to the participating local agencies. These funds provide specific nutritious food supplements to WIC participants and pay specified administrative costs, including those for nutrition education. WIC participants may receive food supplements through a variety of delivery systems: (a) They may receive a voucher which is redeemable for food at local retail stores; (b) they may pick up food from a storage facility; or (c) they may have food delivered to their homes. The local agency may be a public health agency, a welfare agency, or a private, nonprofit health or welfare agency providing health services either directly or indirectly through another agency or physician with which it has contracted for health services.

Nutrition Education: Implementation and Evaluation

The focus on nutrition education has changed throughout the history of the WIC program. The legislation that established WIC on a pilot basis in

1972 did not provide for nutrition education. However, some WIC State programs did provide counseling as an additional service. When WIC was extended in 1975, the amended P.L. 94-105 mandated nationwide nutrition education. Nutrition education was included on the list of allowable administrative costs. The 1975 legislation increased the allowable percentage of authorized funds for administrative costs from 10 to 20 percent. In addition to nutrition education expenditures, administrative costs include expenditures for certification of program participants, eligibility of food delivery, and program monitoring. A requirement to evaluate nutrition education efforts was initiated in fiscal year 1978. The current legislation (P.L. 95-627) requires that at least one-sixth of total administrative costs be spent for nutrition education.

The WIC program pursues two broad nutrition education goals:

1. It emphasizes the relationship of proper nutrition to good health.
2. It assists and encourages participants to change their food habits, thus improving their nutritional status and reducing nutrition-related health problems. It emphasizes supplemental and other nutritious foods, and it attempts to prescribe nutritional diets consistent with ethnic, cultural, and geographical food preferences and with environmental limitations.

In its annual plan, each State identifies its nutrition education objectives and its strategy for reaching these two broad goals. Each participating State is also required to evaluate its nutrition education efforts annually. The delivery of nutrition education through WIC projects varies in method, frequency, and delivering agent. Reviews of State plans and discussions with WIC staff indicate that the most common form of nutrition education seems to be "counseling" at clinics where WIC participants receive

health care. This counseling follows no standardized format and the material presented may differ considerably. Nutrition education programs also differ as to the staff member responsible for nutrition education. Dieticians and nutritionists seem to be the major providers of nutrition education. However, nurses, aides, and clerks are sometimes also responsible.

It will be recalled that at least one-sixth of the funds allotted to a State for administrative costs must be devoted to the nutrition education component of WIC. These funds can also be spent for training staff members who provide nutrition education to participants. An administrative cost report on the WIC program, conducted in 1977, indicated that although figures for administrative costs were fairly precise, few State and local agencies audited could categorize all their administrative costs by function. State and local agencies were not required to maintain records of administrative costs by specific program function; therefore, most functional cost breakdowns were based on estimates (8). Until the end of fiscal year 1979, estimates were accepted as documentation of the level of nutrition education expenditures. WIC regulations for fiscal year 1980 attempt to correct this situation by requiring that all expenditures claimed for nutrition education be based on actual records of expenditures. According to these new regulations, the State agency must document that at least one-sixth of its administrative allowance has gone to nutrition education; however, the agency is not required to maintain records on nutrition education expenditures above the one-sixth minimum. Athough States were not required to submit records on nutrition education expenditures to FNS prior to fiscal year 1980, they presumably maintained such records for earlier years in case of audit.

It is evident from review of the State plans and interviews with WIC nutrition education staff that no attempt has been made to conduct C-E analyses on this component of the program. Each local agency within a State is allowed

to develop its own objectives, choose the methods for meeting these objectives, and select techniques for evaluating how well these objectives have been met. Recognizing that C-E analysis would be difficult to apply, the WIC staff has pointed out that the choice among educational methods depends on the availability of resources and space, the biases and competency of local agency personnel disseminating the nutrition information, and the special needs of program participants, such as ethnic and cultural preferences. (It should also be noted that WIC participants' receipt of supplemental foods is not contingent on their participating in nutrition education activities.) In their fiscal year 1979 State plans in which they reviewed progress made the previous year, some States admitted difficulty in summarizing the types of nutrition education activities that occurred, and particularly the effectiveness of these efforts. Apparently, much diversity exists in reporting format and content; local agencies do not always document their evaluations in an efficient and effective way, and evaluative reports are often couched in a subjective or narrative style.

The usefulness of C-E analysis in evaluating the WIC nutrition education program is limited by several factors: (1) Cost figures are not readily available on expenditures for nutrition education; (2) it is difficult to isolate effects of nutrition education from other programs in the WIC "package"--that is, health services provided and receipt of the food itself; and (3) well-developed nutrition education components may not exist in many local agencies. For example, a 1979 General Accounting Office report, in lamenting the widely differing and often inadequate nutrition education efforts of local agencies, recommended that USDA provide more specific guidance and direction to the States structuring and implementing nutrition education programs (10). All these problems restrict the data base from which improvement in nutrition education methodology could possibly be made.

Expanded Food and Nutrition Education Programs

In 1968, USDA initiated the Expanded Food and Nutrition Education Program (EFNEP), and it was Congressionally funded the following year. The Extension Service of USDA's Science and Education Administration currently administers the program, which operates in each of the 50 States. EFNEP is the largest Federally funded nutrition education program in the United States, with appropriated funds of about $50 million for each year since fiscal year 1973.

Its mandated purpose is to help low-income families--particularly those with young children--improve their diets by teaching them the essentials of nutrition. Extension Service home economists train and supervise para-professional aides, mostly from low-income families, in teaching the basics of good nutrition. These aides then locate families and individuals interested in learning more about nutrition. They recruit interested participants by door-to-door canvassing, by neighborhood contacts, and by references from other agencies. The aides tailor their teaching to individual family needs, providing what Extension Service calls "personalized" lessons about nutrition on a one-to-one basis or in groups of two or three people.

Program Evaluation

Since its inception, EFNEP has been continuously monitored and evaluated to ensure that it is carrying out its intended purpose. EFNEP maintains a National Reporting System (NRS) that provides statistical summaries of operations at county, State, and national levels. The sources of data on enrolled families for NRS include an annual report for all program families that provides data on number and racial/ethnic group of program families and aides, and total payroll hours. Data are obtained every six months from a sample of homemakers that provide more detailed characteristics of families participating in the program, such as family composition, monthly income, age

of homemaker, and participation in food and/or welfare assistance programs. This semiannual report also includes "food consumption behavior" data collected by program sides through the 24-hour food recall method. The first food recall is completed at program entrance, and subsequent recalls are made at 6-month intervals.

Consumption in the four food groups (milk, meat, fruits-vegetables, and breads-cereals) is a basic criterion against which the program's success is measured. EFNEP management has focused specifically on (1) the percentage of homemakers who consume a "minimum" diet of one serving of food from each of the four food groups and (2) the percentage of homemakers who consume two serving each of milk and meat and four servings each of fruits-vegetables and breads-cereals, a diet referred to as "adequate."

NRS generates aggregates of individual variables. EFNEP management uses the NRS information to monitor the program's success in directing its effort at the proper population subgroups. However, NRS data do not enable analysts to assess EFNEP's effect on the nutrition of individual families. Although the data obtained through NRS is taken from a sample of households, all enrolled families are actually asked for a 24-hour recall every 6 months. Furthermore, although individual family data are aggregated for analysis and report purposes through NRS, these individual family data are presumably available from the program management records maintained by individual State EFNEP information systems (7).

Prospects for Cost-Effectiveness Evaluation

Because EFNEP has systematically maintained both cost and evaluative record data, it would appear to lend itself more easily to a C-E evaluation than would the other USDA programs discussed. As explained, the validity of the 24-hour dietary recall procedure is questionable; the use of the four major food groups as a criterion for a nutritious diet has also been criticized.

Nonetheless, for many years, EFNEP was the only Federally sponsored nutrition education program with a mechanism for systematically evaluating its own effectiveness.

As already indicated, funding appropriations since 1973 have been frozen at about $50 million. Since 1973, the number of low-income families served by EFNEP has dropped by about 38 percent. If EFNEP funding continues to drop in real terms, reviewing the cost-effectiveness of some alternative policies may be in order.

Some earlier detailed studies of EFNEP participants, for example, have indicated that homemakers who had fewer servings of each food group at the first food recall reading tended to make more progress than homemakers with more servings (2, 3). It has been suggested that the impact of EFNEP could be increased by restricting the participants to only those families whose assessed nutritional status at program entry is very low (5).

It has been shown that the 24-hour food consumption data from individual families can be converted to scores that represent their behavior as a result of EFNEP participation over time. The scored data can then be aggregated to categorize families (from relatively high to relatively low) based on their 24-hour recall scores taken at time of entrance. The family data can then be examined to determine the maximum consumption level that families categorized as entry-level reach and their rate of progress towards reaching the specified levels (5). The NRS data and other studies also seem to indicate that the greatest progress attaining either a "minimum" or an "adequate" diet occurs within the first 6 months of participation (2, 3). A key question is whether program resources now used in working with families with food consumption levels above a designated point should now be reallocated to work with families with entry-level diets below that criterion. It can be shown that, by examining the rate of improvement of recall scores by various types of families categorized by entry-level score and then comparing by cost figures

per family, one can estimate the costs per point of improvement in diet scores of program participants. If it could be shown, for example, that the costs per point of improvement in the diet scores for program participants with diets below a designated level are substantially less than the costs for program participants with entry-level scores above that designated level, then one could argue that program cost-effectiveness might be enhanced if resources were reallocated to program participants with lower entry-level diet scores. Similar analyses might indicate that retention policies which terminate family participation in the program may be cost-effective if resources normally used in working with program participants beyond a designated level are then freed for other uses (5). A "Progression Model" for EFNEP has been introduced that is intended as a tool for the paraprofessional aide in determining a family's progress. The model provides a scoring table which quantifies reported diets. No information is available as to the extent of or the success with which this model has been employed in the field. The discussion on EFNEP so far has concentrated on assessing the impact of alternative program policies, but it is conceivable that alternative delivery approaches could also be evaluated. Within the program's present data system, for example, analyzing cost-effectiveness of intensive one-to-one modes of teaching versus small-group sessions may be feasible.

CONCLUSION

As previously stated, cost-effectiveness analysis assumes that linking effects to costs provides an appropriate tool for assessing alternative program approaches or for assessing the impacts of alternative policies within a given program. An overview of three USDA programs that incorporate a nutrition education component indicates that, as currently structured, only EFNEP immediately lends itself to this type of assessment. It has the advantage of

maintaining a standardized procedure for collecting indicator information (that is, the 24-hour dietary recall). Furthermore, its total resources are devoted to nutrition education for a target clientele.

Conversely, the NET and WIC Programs include diverse nutritional education activities undertaken by State and intra-State agencies. USDA's reluctance to infringe upon local agencies' ability to individualize nutrition education efforts and evaluations within each of the two programs makes assessing the effectiveness of their nutrition education efforts as related to costs more difficult. The diversity in implementing and evaluating procedures, combined with the differing resources and capabilities of local agencies in carrying out these procedures, invite "outside" evaluations that require the collecting of extensive data from numerous local agencies.

As earlier mentioned in the discussion of the NET Program, through an intensive evaluation of existing projects, it may be possible to identify models or paradigms that show which nutrition education approaches are most cost-effective for a range of project sites having similar characteristics. Given the embryonic stage of research and evaluation of Government nutrition education programs, both NET and WIC may provide information useful in developing and validating innovative projects. Allowing for the differing resources and capabilities of local agencies and the diversity of clients' backgrounds and needs, planners should consider imposing minimum standards (both in terms of delivery strategies and evaluative techniques) on local agencies to assure that quality nutritional information is being presented. More specific information is also needed on how authorized nutrition education funds are currently spent. If USDA nutrition education efforts are to be taken seriously by the taxpaying public, there must be accountability for their costs and results.

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